

Zoomatician

Brief Overview:

In this growling unit students will be exposed to algebraic concepts of patterns, functions, graphing, and problem solving. The students will become zookeepers in order to solve problems to maintain an attractive zoo.

NCTM Content Standard/National Science Education Standard:

Use mathematical models to represent and understand quantitative relationships

- Model problem situations with objects and use representations such as graphs, tables, and equations to draw conclusions.

Grade/Level:

Grades 3 and 4

Duration/Length:

Three lesson- 60 minutes per lesson

Student Outcomes:

Students will:

- Represent and analyze numeric patterns using skip counting
- Generate a rule for the next level of the growing pattern
- Complete a function table using a one operation rule
- Identify positions in a coordinate plane

Materials and Resources:

- Animal Crackers in baggies of 20 for each student
- Bananas
- Painter's Tape
- Construction paper
- Chart paper
- Graph Paper

Development/Procedures:

Lesson 1

Pre-assessment

- Group the students in pairs. Distribute bags of animal crackers to the students. Allow the students to create a pattern using no more than eight crackers and four elements in the core. Instruct the students to continue the pattern created by their partner.
- Assess students understanding of patterns through informal observation.

Launch

- Share and act out the story “Feeding the Monkeys” with the students. (Teacher Resource 1)

Teacher Facilitation

- Create a table using the information from the story. (Teacher Resource 2)
- Facilitate and open discussion of the patterns seen on the table.
- Discuss vocabulary such as patterns, sequential and skip counting.
- Distribute animal cards (Teacher Resource 4) and (Student Resource 2) to the students, and review the directions with students.

Student Application

- Students will use the attributes of an animal to create their own data.
- The students will use the data to create and analyze a pattern. (Student Resource 2)
- Direct students to copy the table on a piece of construction paper that will be posted for the gallery walk.

Embedded Assessment

- Create a gallery walk of the student tables, allowing the students to explain their attribute and pattern.

Re-teaching/Extension

- Extension- Students may wish to explore multiple attributes to create their tables.
- Re-teaching- Display multiple pictures for the students to use to complete the table.

Lesson 2

Pre-assessment

- Display Teacher Resource 5 on the overhead, you may elect to distribute a copy to all students.

Launch

- Refer to the story of “Feeding the Monkeys” (Teacher Resource 1) as you inform the students that a zoo is closing and the zookeeper will have to feed more monkeys. Guide the students, within their groups, in a discussion to determine how many bananas the zookeeper will (Teacher Resource 5) need to feed 25 monkeys. Solicit students to share their solutions.

Teacher Facilitation

- Introduce and model using a function table rule to determine unknown values.
- Use (Teacher Resource 2) to create a rule.
- Distribute copies to students (Student Resource 1) and model another example for the students (Teacher Resource 3).
- Continue the pattern on the chart using the rule.
- Emphasize the definition of a rule (it must work with all elements).

Student Application

- Allow the students time to discover the rule of their table from the previous day.
- Bring the students back to a whole class discussion.
- Create a foldable function table (Teacher Resource 6).
- Direct students to use their rule to complete the foldable function table using new data, reminding them that input values should not be in sequential order.
- Allow students to trade their function table with other students to find their partners rule.

Embedded Assessment

- The teacher will informally assess each student’s foldable function table.

Re-teaching/Extension

- Extension- Allow the students to create a new table using their own rule or multiple operation function.

- Re-teaching – Small group/ or using a number generator to create input numbers.

Lesson 3

Pre-assessment

- Display Teacher Resource 7 on the overhead, you may wish to distribute to all students.

Launch

**Note: You will need to create a coordinate grid on the floor using painters tape.*

- Have the students line up behind the teacher on the origin and explain they are going to go to the 4th floor of a building. Discuss with students how to get to the fourth floor, guiding the discussion around going into the building (x value) first and then up the elevator (y value). Give more examples.

Teacher Facilitation

- Introduce vocabulary to the students (coordinate grid, ordered pairs, origin).
- Show a connection between function tables, ordered pairs, and coordinate grids.
- Model how to use function tables (use the monkey or zebra table) to plot your points on the grid (Students may create grids on their desk using pudding and plotting the animal crackers).
- Connect the dots and discuss patterns you see on the graph.

Student Application

- Using the function tables from the previous day, plot the coordinates on the grid.

Embedded Assessment

- Informally assess the students' completed grids.
- Have the students answer the following question in their math journal:
What patterns or trends do you see in your grid?

Summative Assessment:

- Students will take an assessment (Student Resource 3) consisting of two selected response questions and one brief constructed response. The

assessment will consist of completing a function table, describing patterns in the table, identifying the rule of a function table and plotting points on a coordinate grid. The questions will address patterns, function tables, and coordinate grids and will be used to measure students' progress toward the mastery of these topics. Answers may be found on Teacher Resource 8.

Appendix A: Teacher Resources

Appendix B: Student Resources

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Appendix A: Teacher Resources

Feeding the Monkeys









Part of the zookeeper's job is to feed all of the animals everyday. He/She has to keep careful track of how much each animal eats so he/she knows how much food is needed.

Right now, the monkeys need to be fed. (*Choose 5 students to be "monkeys" and one student to be the "zookeeper."*) The zookeeper gives each monkey two bananas. (*Tell the "zookeeper" to give each student two "bananas."*) Now, let's count how many bananas he needs. For one monkey, he needs 2 bananas. For 2 monkeys, how many bananas are needed? (*Allow the students to answer and count the bananas to check.*) How many bananas are needed for 3 monkeys? 4 monkeys? 5 monkeys? Can you predict how many bananas the zookeeper will need for 6 monkeys? (*Take responses from the students, pick another student to be the 6th monkey, give him/her 2 bananas and count all the bananas to check the answer.*)



Feeding the Monkeys




Number of Monkeys	 1	 2	 3	 4	 5	 6	 7	 8
Number of Bananas	2	4	6	8	10	12	14	16



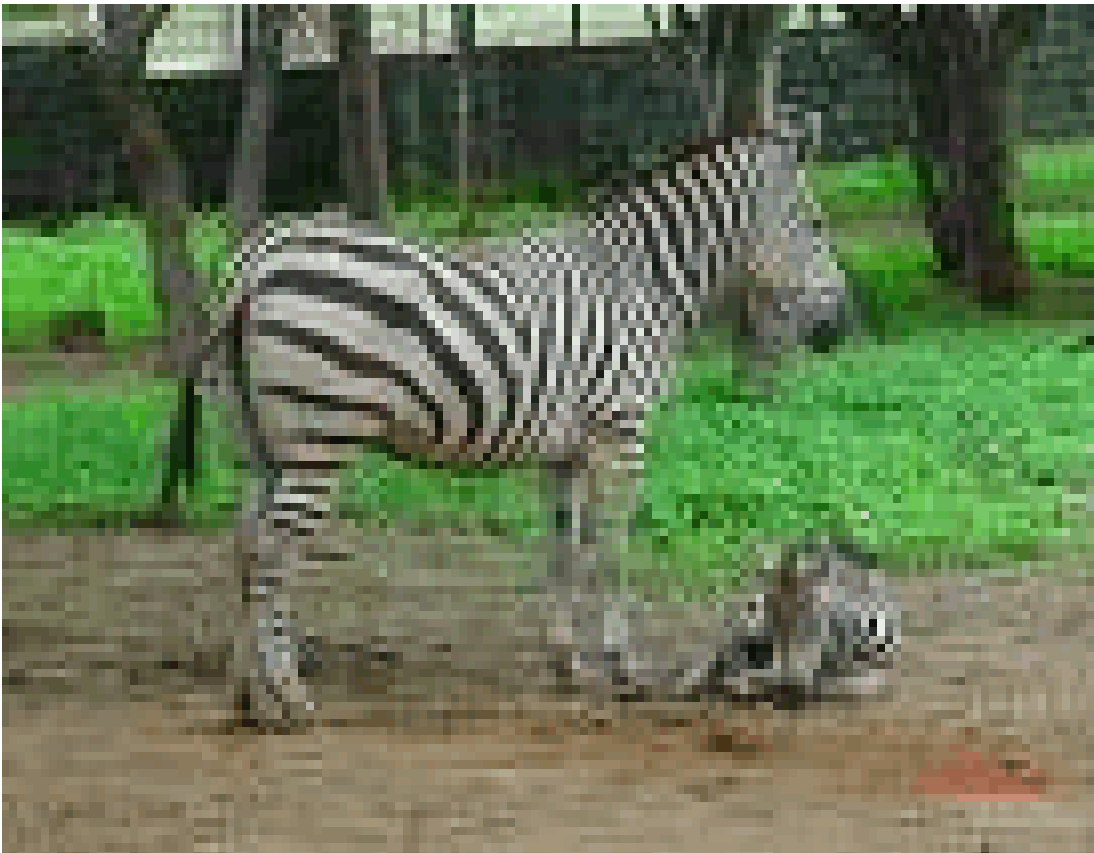


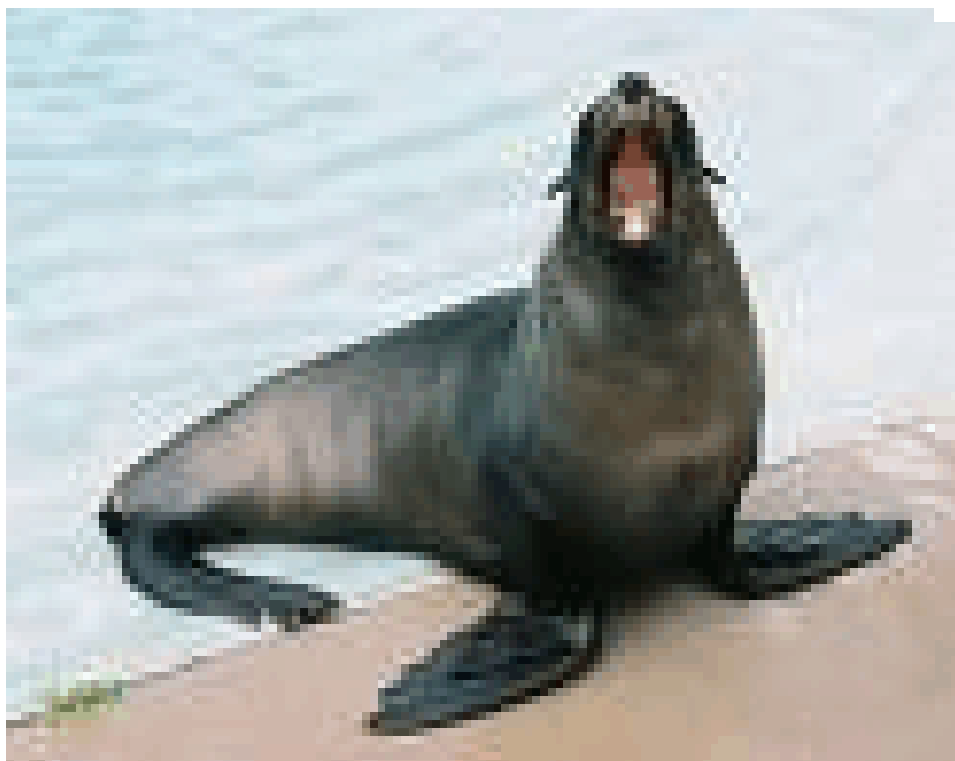
Zebra Stripes



Number of Zebras 	1	7	4	2	8	9
Number of Stripes	10	70	40			











Name _____ Date _____

Pre-Assessment Lesson #2**Directions: Complete the following number sentences by finding the missing value.**

1. _____ + 11 = 16

2. 7 - _____ = 3

3. 4 x _____ = 20

4. 8 + _____ = 10

5. _____ ÷ 6 = 7

6. 9 ÷ _____ = 3

7. 8 X _____ = 24

8. 17 - _____ = 9

9. 6 x _____ = 42

10. 28 + _____ = 37

11. 14 - _____ = 8

12. 42 ÷ _____ = 6

Foldable Function Table

Materials (for each student)

A piece of construction paper (any size)

Scissors

Pencil or markers

Below are the steps to follow to create the foldable function:

1. Fold the paper in half vertically



2. Open and fold each side into the center line



3. Fold the paper in half (horizontally), fold in half again, and fold one more time




(This should give you eight sections).

4. Open from the center. Cut from the edge to the first folded line in order to create



flaps.



5. Label one side, “In,” and the other side, “Out.” 
6. Complete the table by placing the “In” numbers on the outside of the left flap, the Out numbers under the right flap, and the rule on the outside of the right flap.

In	Out
5	7
10	+2
15	17
20	+2
25	27
30	+2
35	37

What's My Rule ?

Gallons	Quarts
4	16
6	24
10	40
5	20
2	8

1. Discover a rule on your own.
2. Discuss your rule with a partner.
3. When you and your partner are finished place your hands on top of your head.

Name: _____ Date: _____

Zoomatician Assessment

1. Choose the values that complete the table

Number of Giraffes	Number of Spots
3	18
5	30
6	
10	

a. 36, 60

b. 36, 42

c. 15, 25

d. 12, 16

2. What's my Rule?

In	Out
15	9
26	20
34	28
13	7

a. + 6

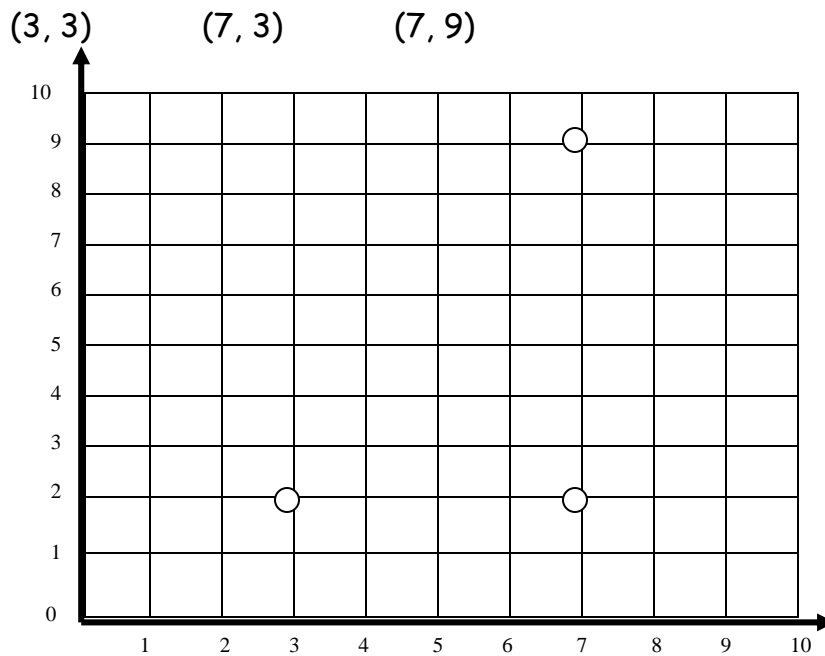
b. + 11

c. - 6

d. - 11

3.

A. Plot the ordered pairs.



B. Explain why your answer is correct.

Use what you know about coordinate points in your explanation.

Use words and/or numbers in your explanation.


First I looked at the ordered pairs, I knew the first number told me to go right and the second number told me to go up. For example I started at the origin, counted right three spaces to the right and three spaces up and place a dot. I did the same for the other points.

Appendix B: Student Resources



Zebra Stripes



Number of Zebras 	1	7	4	2	8	9
Number of Stripes	10	70	40			

Name: _____ Date: _____

Tables and Patterns

Look at the animal you have been given. Choose one attribute of the animal to use for your data. (Examples: number of legs, number of tusks, number of wings, etc.) Create a table for your animal using that attribute. Use the Zebra table to help you!

Number of Animals					
Number of _____					

Look at the table you have created. Do you see any patterns? Describe and explain the pattern you see and how it would help you make predictions if there were more animals.



Name: _____ Date: _____

Zoomatician Assessment

3. Choose the values that complete the table

Number of Giraffes	Number of Spots
3	18
5	30
6	
10	

a. 36, 60 b. 36, 42 c. 15, 25 d. 12, 16

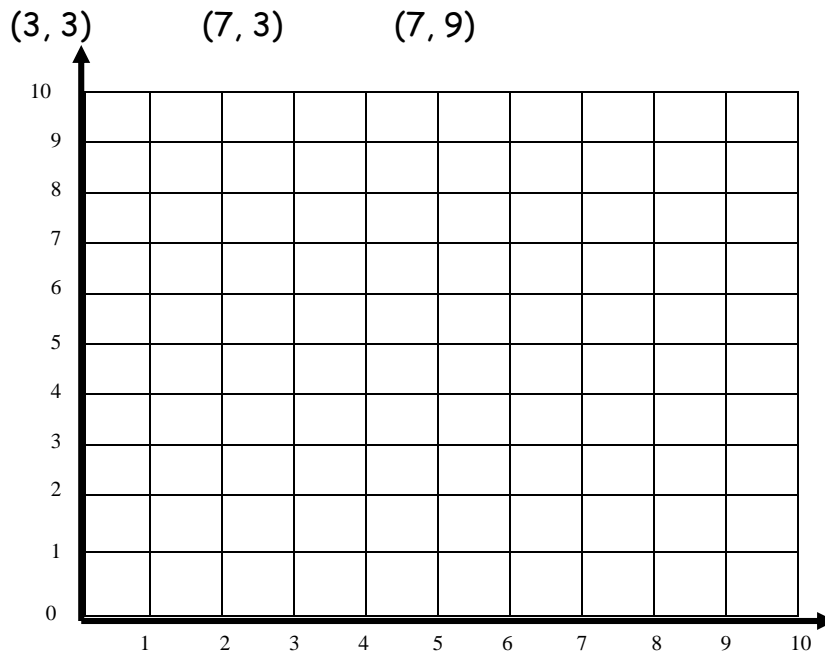
4. What's my Rule?

In	Out
15	9
26	20
34	28
13	7

a. + 6 b. + 11 c. - 6 d. - 11

3.

B. Plot the ordered pairs.



B. Explain why your answer is correct.

Use what you know about coordinate points in your explanation.

Use words and/or numbers in your explanation.
